Docket No.: 50-272

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Dear Mr. Librizzi:

Newark, New Jersey 07101

SUBJECT: NRC STAFF EVALUATION OF PSE&G RESPONSES TO IE BULLETINS 79-05A AND 79-06A, REVISION 1, FOR SALEM GENERATING STATION, UNIT NO. 7

We have reviewed the information provided by your letters dated April 25, May 11, June 1, July 13, and August 14, 1979 in response to IE Bulletins 79-06A and 79-06A, Revision 1, for the Salem Generating Station, Unit No. 1. The enclosure provides our evaluation of your responses with respect to their specificity, completeness, and responsiveness to the intent of said bulletins. In this regard we have found that you have taken appropriate actions to meet the requirements of IE Bulletins 79-06A and 79-06A, Revision 1.

It should be noted that the staff review of the Three Mile Island, Unit 2 acciden is continuing. Consequently, other corrective actions may be required at a later date. For example, IE Bulletin 79-06C was issued on July 26, 1979 requiring new considerations for operation of the reactor coolant pumps following an accident. Our review of the Westinghouse Operating Plants Owners' Group response to Items 2 and 3 of Bulletin 79-06C (Westinghouse reports WCAP-9584 and WCAP-9600, respectiv and your response dated August 29, 1979 is continuing. You will be informed of the results of this review by separate correspondence. In addition, new requirements may result from our generic review of procedures for operating Westinghouse designed plants, our review of plant performance during feedwater transients and small-break loss-of-coolant accidents, and from our review of licensees' response to the requirements delineated in NUREG-0578.

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UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D. C. 20555

December 31, 1979

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Mr. F. P. Librizzi, General Manager Electric Production Public Service Electric & Gas Company 80 Park Place, Room 7221 Newark, New Jersey 07101

Dear Mr. Librizzi:

SUBJECT: NRC STAFF EVALUATION OF PSE&G RESPONSES TO IE BULLETINS 79-06A AND 79-06A, REVISION 1, FOR SALEM GENERATING STATION, UNIT NO. 1

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Sincerely, ler A. Schwencer, Chief

A. Schwencer, Chief Operating Reactors Branch #1 Division of Operating Reactors

Enclosure: Evaluation of Licensee's Responses to IE Bulletins 79-06A and 79-06A, Revision 1 Mr. F. P. Librizzi Public Service Electric and Gas Company

December 31, 1979

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## EVALUATION OF LICENSEE'S RESPONSES TO IE BULLETINS 79-06A AND 79-06A (REVISION 1) SALEM GENERATING STATION, UNIT NO. 1 - DOCKET NO. 50-272

## INTRODUCTION

By letters dated April 14, 1979 and April 18, 1979, we transmitted I&E Bulletins No. 79-06A and No. 79-06A (Revision 1), respectively, to Public Service Electric and Gas Company (PSE&G or the licensee). These Bulletins specified actions to be taken by the licensee to avoid occurrence of an event similar to that which occurred at Three Mile Island, Unit No. 2 (TMI-2), on March 28, 1979. By letters dated April 25 and June 1, 1979, PSE&G provided their response in conformance with the requirements of these Bulletins for the Salem Generating Station, Unit No. 1. PSE&G supplemented these responses by letters dated July 13 and August 14, 1979, providing clarification and elaboration of certain of the Bulletin Action Items in response to our expressed concerns.

Our evaluation of the responses, as supplemented, is given below.

## Evaluation

In this evaluation, the paragraph numbers correspond to the bulletin action items and to the licensee's response to each action item.

1. On April 20, 1979, an NRC briefing team provided a detailed review of the circumstances described in Enclosure 1 of IE Bulletin 79-05 and the preliminary chronology of the TMI-2 accident (included in Enclosure 1 of IE Bulletin 79-05A) to licensed station personnel and plant management. The briefing team consisted of an Office of Inspection and Enforcement (IE) Group Leader, an Operator Licensing Branch (NRR/OLB) representative, and the facility Principal/Resident Inspector. Attendance was documented, with any missing personnel being briefed at a later date by the NRC Principal/Resident Inspector. The NRC briefing also provided a detailed review of Action Item Nos. 1.a and 1.b of IE Bulletin 79-06A. In their response, PSE&G stated that an overall package of TMI-related training will include additional review of the sequence of events at TMI-2 and additional procedural requirements regarding the termination of engineered safety features. As part of PSE&G's existing operator qualification program, documentation is maintained of lecture attendance and procedure review.

We consider these actions to be acceptable responses to Action Item No. 1.

2.

Action Item 2 of the Bulletin requested licensees to review actions required by operating procedures for coping with transients and accidents, with particular attention to (a) recognition of the possibility of forming voids large enough to compromise core cooling capability, (b) action required to prevent the formation of such voids, and (c) action required to enhance core cooling in the event such voids are formed. Emphasis in (a) was placed on natural circulation capability.

In their response to this Bulletin Action Item, PSE&G referenced the work of the Westinghouse Operating Plants Owners' Group (PSE&G is a member of this Owners' Group). In conjunction with Westinghouse, the Owners' Group

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has developed generic guidelines for emergency operating procedures regarding small-break loss-of-coolant accidents (LUCAs). In its November 5, and December 6, 1979 letters to the Owners' Group, the staff approved these guidelines for implementation by licensees with Westinghouse-designed reactors. The Owners' Group and Westinghouse have also developed generic guidelines for emergency procedures regarding natural circulation. These generic guidelines were submitted as part of the Owners' Group response to the requirements of NUREG-0578 regarding inadequate core cooling.

PSE&G has committed to incorporate the generic guidelines developed by the Owners' Group into its plant procedures and operator training program. In order to satisfy NUREG-0578 requirements, this effort should be complete by January 1980. We will verify that the guidelines have been properly implemented. Procedures based on these generic guidelines represent an acceptable method of complying with Bulletin Action Item No. 2.

PSE&G has also installed a computer program which provides the operator additional information relative to recognizing the possible formation of voids in the primary coolant system. This program computes the margin to saturation conditions based on the hottest in-core thermocouple reading and the reactor coolant system pressure. This program indicates the degrees of subcooling. An alarm is generated if 50° of subcooling does not exist whenever reactor power is less than 0.25%. An alarm is also generated if the difference between actual and saturation pressure is less than 200 psi.

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We find that licensee has provided an acceptable response to Bulletin Action Item No. 2.

3. The pressurizer low-level bistables for safety injection are in a tripped condition. They will be maintained in this condition until the design change to a revised low pressure logic is completed. This design change moves the level input requirement and changes the pressure coincidence to a two-out-of-three logic for initiation of safety injection.

Existing procedures direct the operators to manually initiate any protection functions, if the automatic initiation fails. Although this ensures manual initiation of safety injection on low pressurizer pressure, additional training was given to operating personnel in light of the TMI-2 accident which addressed the revised logic. This training effort was completed in August 1979.

We find the licensee's response to Bulletin Action Item No. 3 acceptable.

- 4. The Salem Unit No. 1 design provides for automatic initiation of containment isolation upon safety injection actuation, as called for in the bulletin. This aspect of the licensee's response is therefore acceptable.
  - Containment isolation consists of a Phase A and a Phase B isolation. Phase A involves closure of automatic valves in all nonessential process lines; Phase B isolates all remaining process lines, except for safety injection, containment spray, and auxiliary feedwater.

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The reactor coolant pump seal water discharge line is isolated upon a Phase A signal. The seal water supply line is not provided with isolation valves. The component cooling water supply and return lines for the reactor coolant pumps are isolated by a Phase B signal. The reactor coolant pumps do not trip automatically on either isolation signal. Therefore, the pumps must be manually tripped following a Phase B isolation, since component cooling to the motor coolers and thermal barriers is lost.

We find that the licensee has adequately addressed the concerns expressed in Bulletin Action Item No. 4.

- 5. The auxiliary feedwater system is automatically initiated at Salem Unit No. 1, with no operator action required in order to ensure adequate flow. Therefore, Bulletin Action Item No. 5 does not apply to this plant.
- 6. Current Salem Unit No. 1 procedures assure that operating personnel are aware of plant indications available to detect an open pressurizer PORV. These procedures include instructions to isolate the PORV if it is stuck open. In their response to this item, PSE&G also identified the information that is available to the operator which provides indication of an open PORV.

We find the licensee's response to Bulletin Action Item No. 6 acceptable.

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7a. In its July 13, 1979 supplemental response to this item, PSE&G stated that a complete review of the Salem Unit No. 1 station procedures indicated that the only engineered safety feature which is overridden is safety injection. PSE&G referenced the works of the Westinghouse Operating Plants Owners' Group concerning resolution with the NRC staff of the conditions under which safety injection may be overridden and terminated. The PSE&G response included a commitment to incorporate the resolution of this issue between the Owners' Group and the staff into the station procedures.

PSE&G also stated that it had discovered that is was possible to inadvertently override the RMS interlock on the Containment Ventilation System by improper operation of the reset functions. To prevent occurrence of this situation, additional instructions were issued to the operators and were included in the procedures and the operator training program. Because of the discovery of this problem, PSE&G undertook an investigation to verify that there were no similar situations. The results of that review verified that safety functions are not overidden and are allowed to go to completion, as considered in the plant design bases.

We find that the licensee has addressed the concerns expressed in this Bulletin Action Item in an acceptable manner.

7b. As stated above, PSE&G committed to the resolution of the issue regarding termination of safety injection between the Owners' Group and the staff. In our November 5, 1979 letter to the Owners' Group, we approved generic guidelines for emergency procedures regarding small break LOCAs for incorporation by licensees into their plant procedures. These approved guidelines include the following criteria for termination of safety injection:

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- The reactor coolant system pressure is greater than 2000 psig and increasing, and
- (2) The pressurizer water level is greater than 50% of span, and
- (3) The reactor coolant indicated subcooling is greater than (insert plant-specific value of subcooling based on full power normal operation), and
- (4) The water level in at least one steam generator is in the narrow range span, or in the wide range span at a level sufficient to assure that the U-tubes are covered.

Details of our evaluation of this issue will be included in the forthcoming staff report (NUREG-0611) of our generic review of Westinghousedesigned operating plants.

We will verify that the approved Westinghouse generic safety injection termination criteria have been properly incorporated in the Salem Unit 1 plant procedures. Pending such verification, we find that the licensee's response to this Bulletin Action Item is acceptable.

7c. In their April 25, 1979 response to this item, PSE&G stated that Westinghouse had advised it to manually trip all reactor coolant pumps in LOCA's and steam line break accidents when the following conditions were satisfied: verification of ECCS operability, decreasing reactor colant system pressure, or occurrence of Phase B containment isolation.

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Following discussion with the staff about the April 25 response, PSE&G, in its July 13, 1979 letter, committed to the resolution of this issue between the staff and the Owners' Group.

On July 26, 1979 IE Bulletin 79-06C superseded Action Item 7.c of Bulletin 79-06A. Bulletin 79-06C required that, as a short-term action, licensees were to trip all reactor coolant pumps after an initia of safety injection caused by low reactor coolant system pressure. In its August 29, 1979 response, PSE&G stated its conformance with this requirement. This action was to remain in effect until the results of analyses defined in IE Bulletin 79-06C had been used to develop new guidelines for operator action.

We have completed our review of the reactor coolant pump trip issue with the Owners' Group. The generic guidelines for emergency procedures regarding small break LOCAs which we approved in our November 5, 1979 letter, contain the approved pump trip criteria for Westinghouse-designed operating plants. Basically they are as follows:

Stop all reactor coolant pumps after high pressure safety injection pump operation has been verified and when the wide range reactor coolant pressure is at (plant-specific pressure derived from secondary system relief capacity, primary to secondary system pressure difference, and instrument inaccuracies).

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The details of our review of the pump trip issue are reported in the forthcoming NUREG-0623.

Since the licensee has committed to incorporate the pump trip criteria as specified in the approved generic guidelines into the Salem Unit 1 procedures, we find the licensee's response to this Bulletin Action Item acceptable.

7d. In its response to this item, PSE&G stated that a portion of the TMIrelated training to be accomplished in August 1979 would instruct operating personnel not to rely upon a single parameter alone. PSE&G further stated that the generic guidelines for emergency procedures being developed by the Owners' Group and Westinghouse would include the appropriate additional parameters to be used by the operators for evaluating plant conditions. PSE&G committed to incorporate the generic guidelines into the Salem Unit No. 1 procedures after they have been approved by the staff.

Pending our verification of the licensee's commitment to incorporate the approved guidelines into the plant procedures, we find the licensee's response to this Bulletin Action Item acceptable.

8. This Bulletin Action Item required the review of alignment and alignment requirements and controls for all safety-related valves necessary for proper operation of engineered safety features. PSE&G has completed the required review and incorporated all necessary changes into the plant procedures. The status of key safety system valves was verified by visual examination shortly after the TMI-2 accident.

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All safety-related valves which are locked in the proper position are verified by surveillance procedure. Valve positions which are changed from normal positions are recorded in the valve deviation log and the operator's shift log. All system valve lineups were completed prior to plant startup.

We find the licensee's response to Bulletin Action Item No. 8 acceptable.

9. In Bulletin Action Item No. 9, licensees were requested to review their procedures to assure that radioactivity will not be inadvertently released from containment. Particular emphasis was placed on resetting of engineered safety features CESFs and the effect of this action on valves controlling the release of radioactivity.

In its response, PSE&G identified all systems which are designed to transfer potentially radioactive fluids from containment. For each of these systems, PSE&G addressed high radiation interlocks, containment isolation (Phase A and Phase B), and operability assurances, as requested. Two instances were identified, the Reactor Coolant Drain Tank pump discharge line and the Pressurizer Relief Tank gas analyzer line, which could result in the inadvertent transfer of radioactive material from the containment. PSE&G stated that design changes to revise the control circuitry to prevent the occurrence of an open pathway in these two instances would be implemented before plant startup for Cycle 2. (At the time of their response, Salem Unit No. 1 was shut down for refueling'.

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We find the licensee's actions in response to Bulletin Action Item No. 9 acceptable.

10. For safety-related systems, Action Item 10 required that licensees review and modify, as necessary, maintenance and test procedures to ensure that they require that: (a) redundant systems are operable before a system is taken out of service, (b) systems are operable when returned to service, and (c) operators are made aware of the status of these systems.

PSE&G has reviewed station procedures and revised them, where necessary, to detail requirements for verifying the operability of redundant equipment prior to removing safety-related equipment from service and verifying the operability of equipment when it is returned to service. Both systems level considerations and individual safety-system equipment are addressed.

PSE&G stated that the Shift Supervisor/Senior Shift Supervisor is responsible for approving all requests for removal of equipment for service. The control operator prepares the necessary administrative tags which are used to identify equipment removed from service. The equipment operator places these tags on the equipment taken out of service. The control operator also indicates control room equipment out-of-service by the use of tags and other identification methods.

In order to adequately handle system status at shift change, PSE&G developed and implemented a formal shift turnover procedure. We find that the licensee has adequately addressed all of the concerns expressed in Bulletin Action Item No. 10.

- 11. Station Supervisory Letter SL-9, "Notification of Federal and State Agencies," has been revised and issued to require notification of the NRC within one hour of the plant being in an uncontrolled or unexpected condition. Telephone lines to establish the required open line of communication between the Salem plant and IE Region I via Bethesda, Maryland have been installed and are now functional. Additional telephone lines to provide communications from the Salem plant to the NRC for radiation protection/chemistry matters will be installed after receipt of orders from NRC. The Station Emergency Plan has been revised to include the location and use of these lines. The licensee's actions are considered an acceptable response to Bulletin Action Item No. 11.
- 12. In its response to this item, PSE&G stated that it was continuing to review the modes for controlling hydrogen in the reactor coolant system. All procedural changes for coolant system and containment hydrogen control were to be implemented prior to Unit 1's return to power from the recent outage.

The options for removal of hydrogen from the reactor coolant system include (1) stripping hydrogen from the reactor coolant to the pressurizer vapor space and venting to the pressurizer relief tank, (2) removing hydrogen from the reactor coolant system via the letdown line and stripping it in the volume control tank and venting through the waste gas system, and (3) in the event of a LOCA, hydrogen would vent with steam into containment.

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PSE&G also described modes and procedures for removal of a noncondensible gas bubble from the primary coolant system while maintaining core cooling.

In addition, PSE&G is participating in the Westinghouse Operating Plant Owners' Group efforts to develop general guidelines for emergency operational procedures regarding inadequate core cooling in response to the requirements of NUREG-0578. Treatment of noncondensible gas in the reactor coolant system is being considered in the development of these guidelines.

During recent discussions with PSE&G, we have been informed that each of the options for dealing with hydrogen described above will be incorporated in the plant procedures where needed to address various plant conditions. This implementation will be completed by January 1, 1980. We will verify that this commitment has been fulfilled.

We find that the licensee's actions in response to the concerns expressed in Action Item No. 12 are acceptable.

13. This Bulletin Action Item requested licensees to propose changes to the plant Technical Specifications, as required, which had to be modified as a result of implementing Action Items 1 through 12.

In their June 1, 1979 letter, PSE&G identified the design changes and Technical Specification changes that were required, up to that time,

to implement Bulletin Action Items 1 through 12. According to PSE&G, the only required Technical Specification change reflected deletion of the coincident Pressurizer Low Level and Low Pressure Signals for initiating safety injection. As discussed in our evaluation of Bulletin Action Item No. 3, the revised design consists of a two-out-of-three coincidence of Pressurizer Low Pressure Signals.

We find that the licensee has made an adequate response to Bulletin Action Item No. 13.

## CONCLUSIONS

Based on our review of the information provided by the licensee, we conclude that the licensee has correctly interpreted IE Bulletins 79-06A and 79-06A, Revision 1. The actions taken demonstrate the licensee's understanding of the concerns arising from the Three Mile Island, Unit No. 2 accident in relation to their implications on his own operations, and provide added assurance for the protection of the public health and safety during plant operation.

This conclusion, notwithstanding, should be recognized that further actions may result from the staff's ongoing review of operating plants using nuclear steam supply systems designed by Westinghouse. Additional changes may result from the requirements contained in NUREG-0578 (e.g., the actions being taken for Item 6 of Bulletin 79-06A regarding the PORV's). Our evaluation of such matters will be provided in other reports.

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